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Date: January 4, 2023

Project Number: 19-009

Subject: 301 Mission Shoring Wall Monitoring Report 087: Results as of January 3, 2023

CONTEXT

This memorandum summarizes results from the monitoring plan implemented at the 301 Mission property. Inclinometers IPI-04 and IPI-05 were installed on August 15 and 16, 2022, to monitor the shoring wall during subterranean work along Mission Street. Inclinometers IPI-01, IPI-02 and IPI-03 were installed on December 2 and 5, 2022, to monitor the shoring wall during subterranean work along Fremont Street. This memorandum is for review only. It only contains ongoing monitoring information. This memorandum does not contain recommendations based upon the ongoing monitoring information.

INTERPRETATION

Figure I-01 presents the instrument locations as referenced in later figures.

Figure I-02A presents inclinometer data from Mission Street since September 6, 2022, through January 3, 2023. September 6, 2022, was used for the initial reading as it was the final day of data prior to the commencement of jet grouting on Mission Street, which started on September 8, 2022. Lateral deflections are calculated based on the tilt angle recorded at four segments along each inclinometer. It is assumed that the bottom of the deepest segment is fixed in place and movement is measured relative to the point of fixity. The baseline deflections calculated from data recorded at 12:00 PM on September 6, 2022, are subtracted from the calculated deflections. Note that deflection of inclinometers due to shoring wall installation and excavation is calculated as follows:

$$D = L_1 \sin \theta_1 + L_2 \sin \theta_2 + L_3 \sin \theta_3 + L_4 \sin \theta_4$$

where: D is total deflection, L is the length of the inclinometer segment, and θ is the degrees of tilt of the inclinometer sensor.

As discussed previously, the deflections at each depth are rotated to align with the shoring axes as follows:

$$D_{A'} = D_A \cos \psi - D_B \sin \psi \quad D_{B'} = D_A \sin \psi + D_B \cos \psi$$

where: $D_{A'}$ is the deflection along the rotated major axis, $D_{B'}$ is the deflection along the rotated minor axis, D_A is the deflection along the instrument major axis, D_B is the deflection along the instrument minor axis, and ψ is the angle between rotated and instrument axes.



Note that from November 10, 2022, and onwards Figures I-02A and I-02B exclude inclinometer data from the surface for both IPI-04 and IPI-05. This is due to the interference of a waler. Please refer to Shoring Monitoring Memo 079, dated November 14, 2022, for additional information.

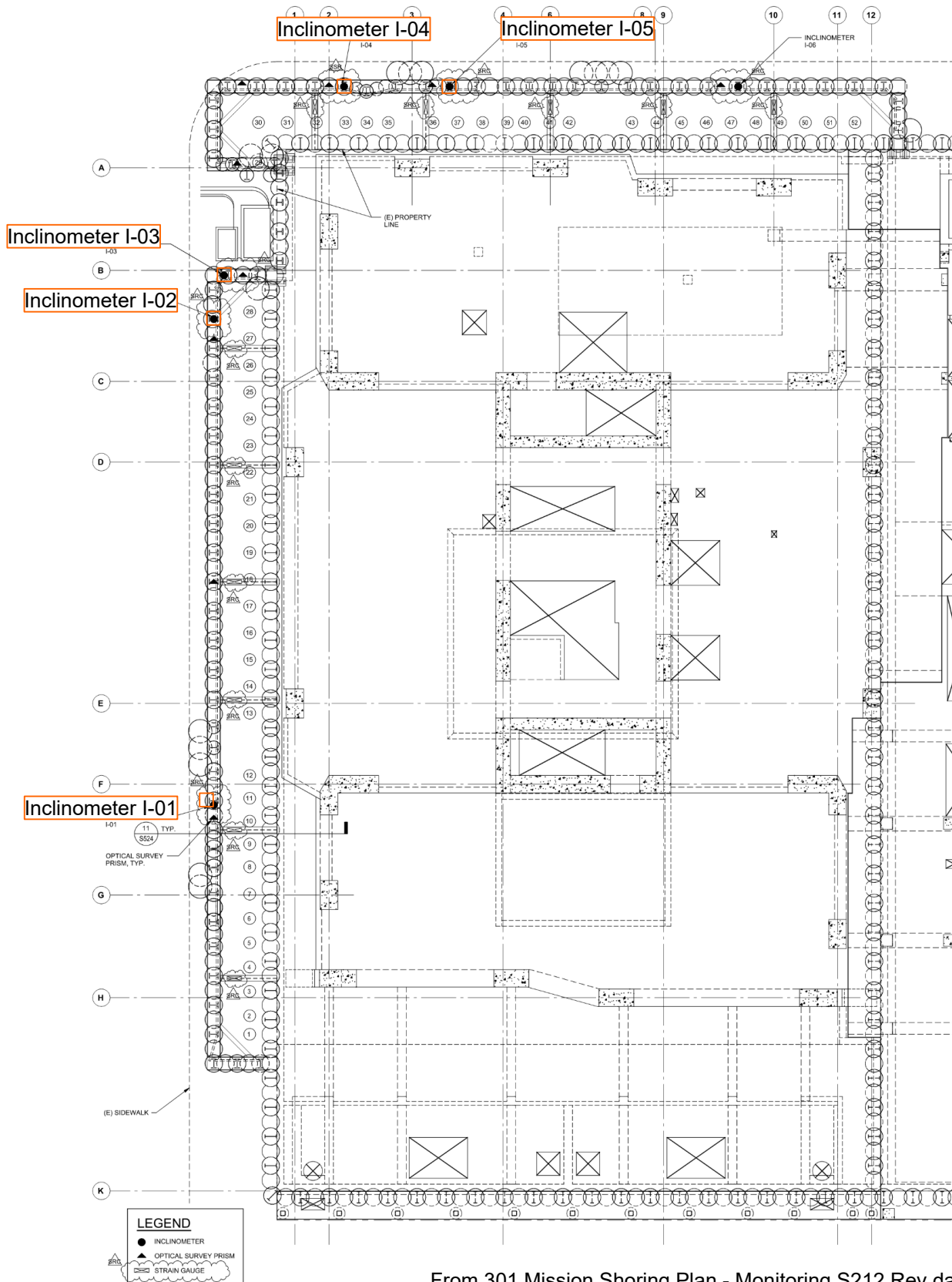
Figures I-03A and I-03B present inclinometer data from Fremont Street since December 6, 2022, through January 3, 2023, and December 16, 2022, respectively. December 6, 2022, was used for the initial reading as it was the final day of data prior to the commencement of jet grouting on Fremont Street, which started on December 7, 2022. Lateral deflections are calculated, baselined at 11:00 PM on December 6, 2022, and rotated to align with the shoring axes similarly as discussed above. Data from both axes of IPI-03 are presented since the instrument array is near the corner of the excavation.

CLOSING

Note that IPI-03 has been offline since December 16, 2022, and IPI-02 has been offline since December 20, 2022; work to correct this is ongoing. Please contact us if you have any comments or questions, or if you would like to discuss the results presented in this memorandum.

FIGURES

- Figure I-01 – Instrument Location Map - Inclinometers
- Figure I-02 – Inclinometers near 301 Mission – Mission Street: IPI-04, IPI-05
- Figure I-03A – Inclinometers near 301 Mission – Fremont Street: IPI-01, IPI-02
- Figure I-03B – Inclinometer near 301 Mission – Fremont Street: IPI-03



Project No: 19-009.00

Date: 9/22/2022

Created By: TB

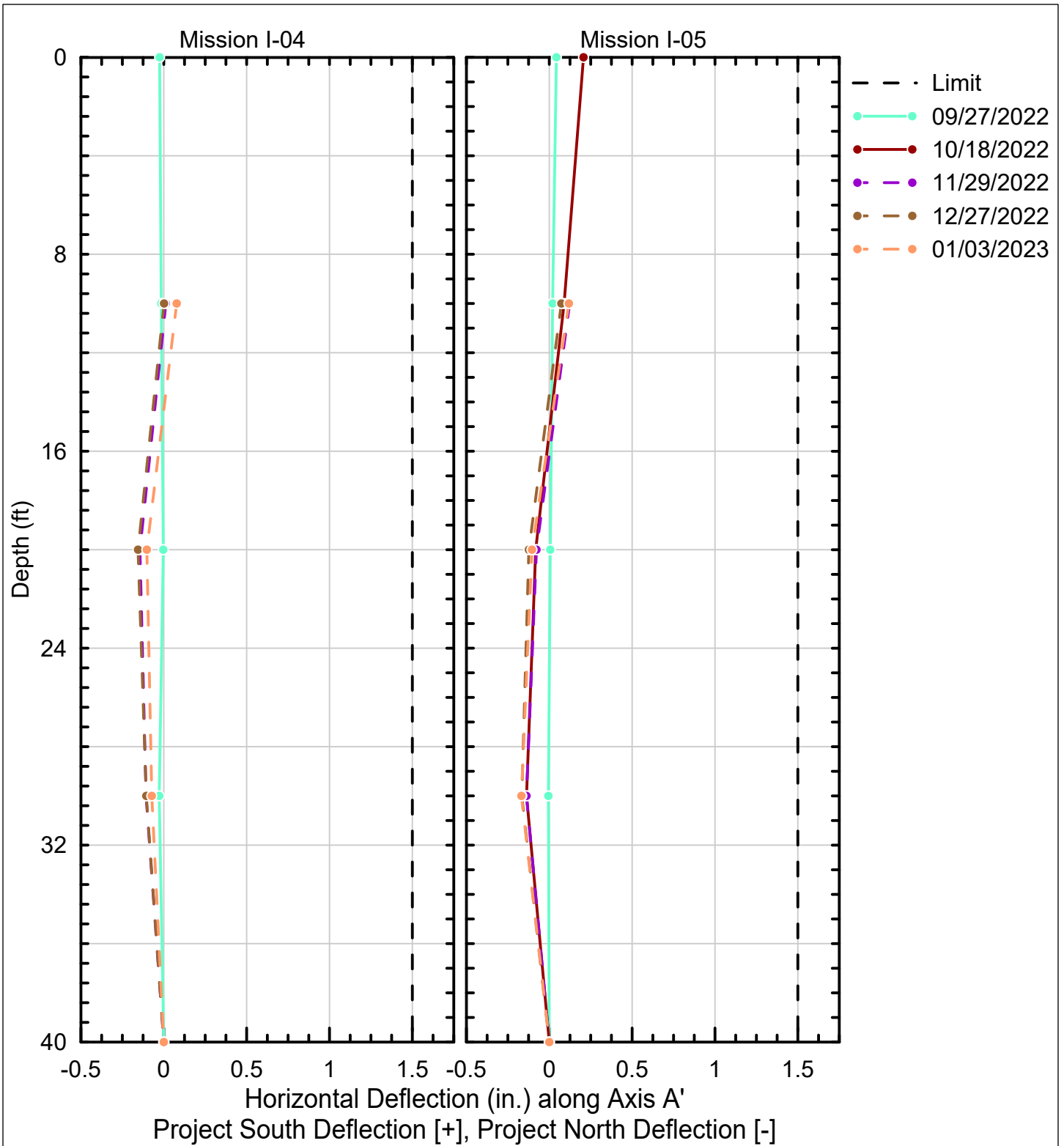
Checked By: DGM

Figure No: **0871-01**



INSTRUMENT LOCATION MAP INCLINOMETERS

Shoring Wall Instrumentation Monitoring for the Perimeter Pile Upgrade
City and County of San Francisco, California



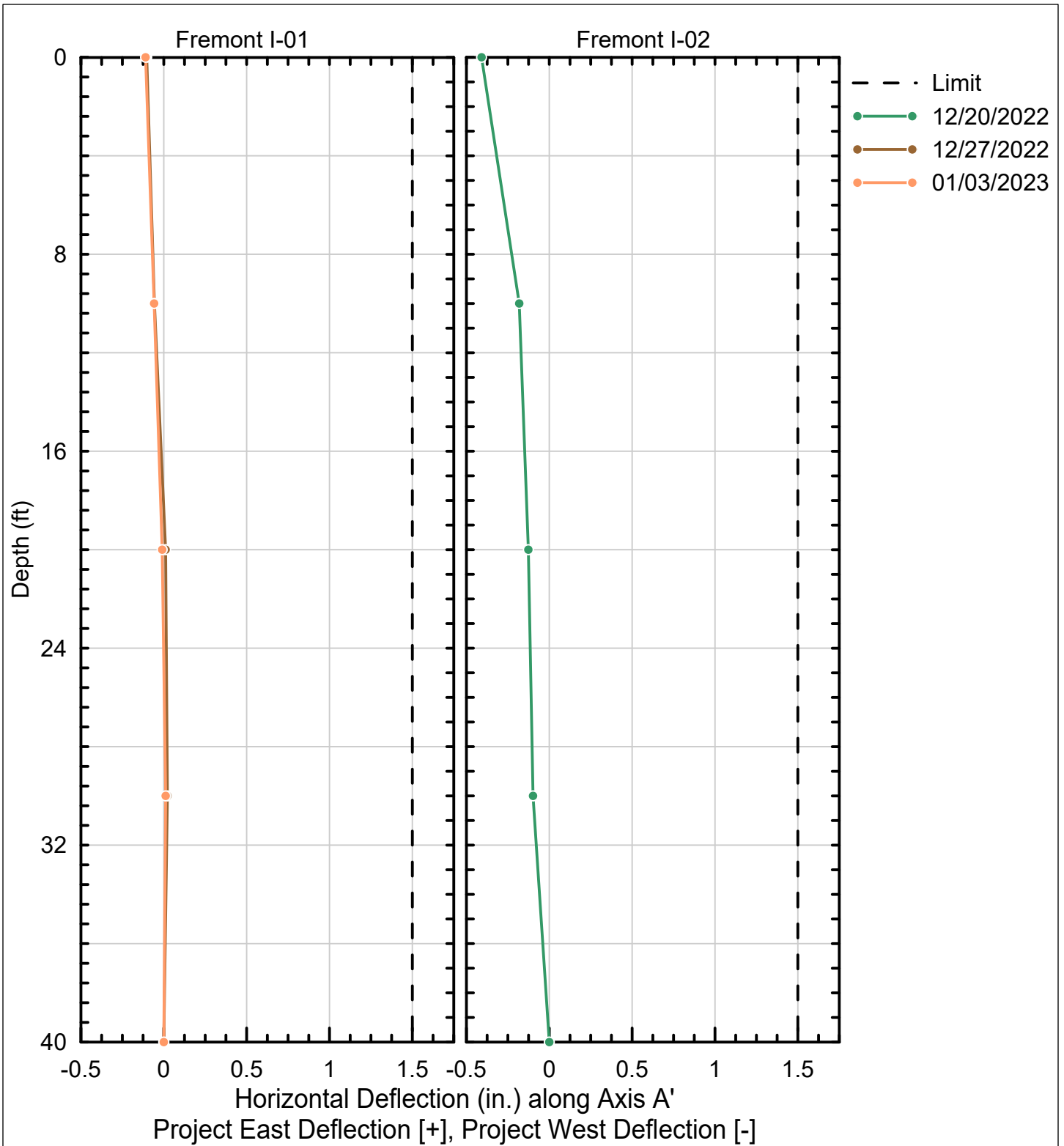
Note: Differential Movement from Baseline Reading 09/06/2022, 12:00 PM

Project No: 19-009.00	Date: 1/4/2023	Created By: NBW	Checked By: DGM	Figure No: 087I-02
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INCLINOMETERS NEAR 301 MISSION
MISSION STREET: IPI-04, IPI-05
SINCE 09/06/2022 THROUGH 01/03/2023
Shoring Wall Instrumentation Monitoring for the Perimeter Pile Upgrade
City and County of San Francisco, California

Filepath: S:\StateDrive - Documents\Projects_2019\19-009.00_Millennium Tower Retrofit\10_Construction\01_Monitoring Report Data\ShoringWall\00_Figures\Fig_3A_Incl_Fremont.grf



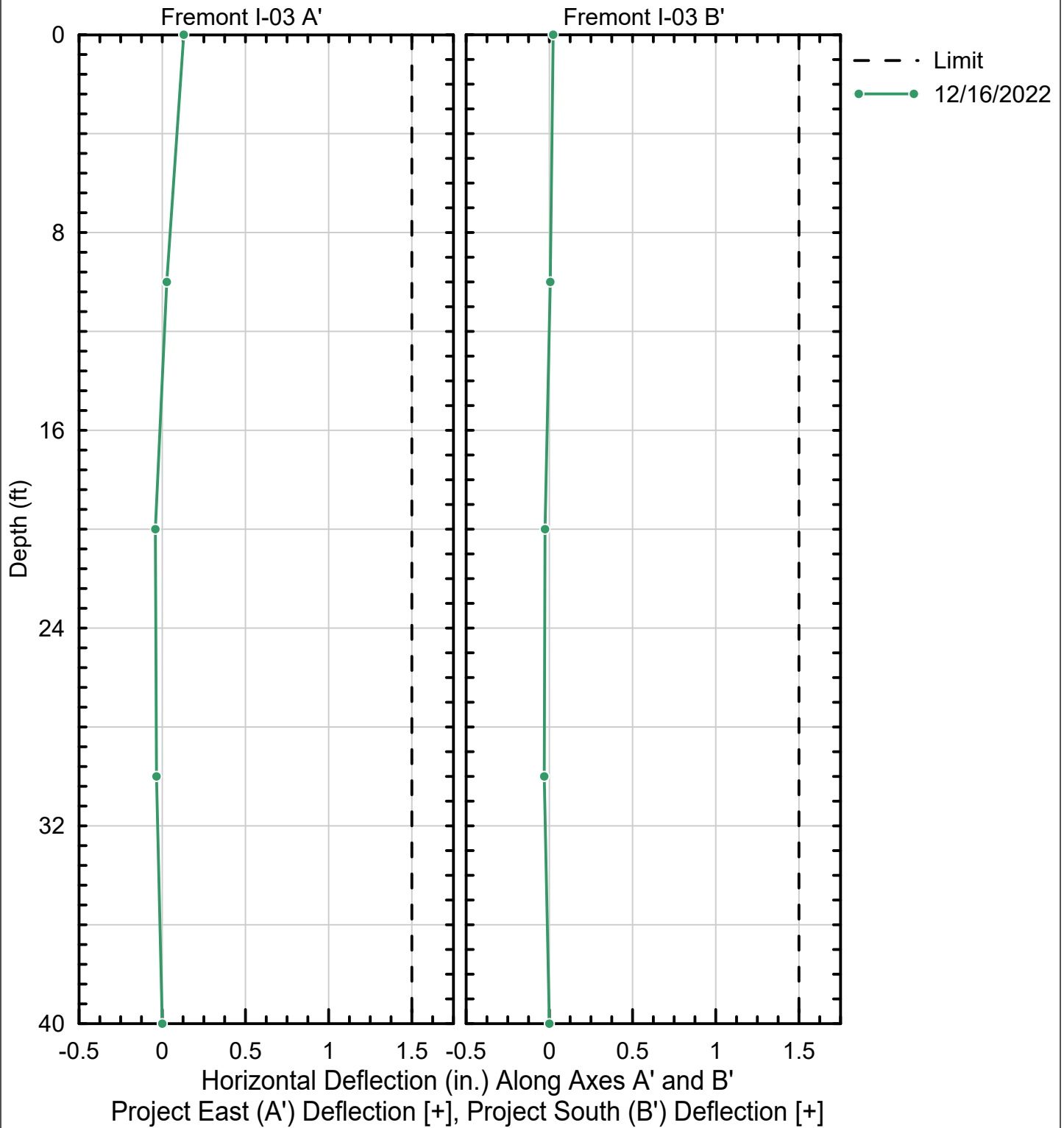
Note: Differential Movement from Baseline Reading 12/06/2022, 11:00 PM

Project No: 19-009.00	Date: 1/4/2023	Created By: NBW	Checked By: DGM	Figure No: 087I-03A
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INCLINOMETERS NEAR 301 MISSION
FREMONT STREET: IPI-01, IPI-02
SINCE 12/06/2022 THROUGH 01/03/2023
Shoring Wall Instrumentation Monitoring for the Perimeter Pile Upgrade
City and County of San Francisco, California

Filepath: S:\StateDrive - Documents\Projects_2019\19-009.00_Millennium Tower Retrofit\10_Construction\01_Monitoring Report Data\ShoringWall\00_Figures\Fig_3B_Incl_Fremont.grf



Note: Differential Movement from Baseline Reading 12/06/2022, 11:00 PM

Project No: 19-009.00	Date: 1/4/2023	Created By: NBW	Checked By: DGM	Figure No: 087I-03B
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INCLINOMETER NEAR 301 MISSION
FREMONT STREET: IPI-03
SINCE 12/06/2022 THROUGH 01/03/2023
Shoring Wall Instrumentation Monitoring for the Perimeter Pile Upgrade
City and County of San Francisco, California